CLAIMS

What is claimed is:

1. A method for implementing a multi-step pseudo random sequence (PRS) generator, comprising:

determining relationships between outputs of flip-flops of an initial model PRS generator at a current time step t with the outputs of the flip-flops at a time step t-n, where n is a number of coefficients to be generated per time step; and

coupling flip-flops in the multi-step PRS generator in response to the relationships between the outputs of the flip-flops at the current time step t with the output of the flip-flops at the time step t-n.

2. The method of Claim 1, further comprising the step of selecting a number of flip-flops, L, based on a length of the code sequence and a number of coefficients of the code sequence to be generated per time step.

3. The method of Claim 1, further comprising the step of selecting a generator polynomial for the initial model PRS generator.

4. The method of Claim 1, wherein determining the relationships between the outputs of the flip-flops of the initial model PRS generator at the current time step t with the outputs of the flip-flops at the time step t-n comprises:

determining relationships between outputs of the flip-flops at a current time step t with the outputs of the flip-flops at a time step t-1;

determining relationships between the outputs the flip-flops at the time step t-1 with the outputs of the flip-flops at a time step t-2; and

determining relationships between the outputs of the flip-flops at the current time step t with the outputs of the flip-flops at the time step t-2.

5. The method of Claim 4, wherein determining the relationships between the outputs of the flip-flops of the initial model PRS generator at the current time step t with the output of the flip-flops at the time step t-n further comprises:

determining relationships between the outputs the flip-flops at the time step t-2 with the outputs of the flip-flops at a time step t-3; and

determining relationships between the outputs of the flip-flops at the current time step t with the outputs of the flip-flops at the time step t-3.

6. The method of Claim 5, wherein determining the relationships between the outputs of the flip-flops of the initial model PRS generator at the current time step t with the output of the flip-flops at the time step t-n further comprises:

determining relationships between the outputs the flip-flops at the time step t-3 with the outputs of the flip-flops at a time step t-4; and

determining relationships between the outputs of the flip-flops at the current time step t with the outputs of the flip-flops at the time step t-4.

7. The method of Claim 6, wherein determining the relationships between the outputs of the flip-flops of the initial model PRS generator at the current time step t with the output of the flip-flops at the time step t-n further comprises:

determining relationships between the outputs the flip-flops at the time step t-4 with the outputs of the flip-flops at a time step t-5; and

determining relationships between the outputs of the flip-flops at the current time step t with the outputs of the flip-flops at the time step t-5.

8. A method for implementing a multi-step pseudo random sequence (PRS) generator, comprising:

selecting a number of flip-flops for an initial model PRS generator, L, based on a length of the code sequence and a number of coefficients of the code sequence to be generated per time step;

selecting a generator polynomial for the initial model PRS generator;

determining relationships between outputs of the flip-flops at a current time step t with the output of the flip-flops at a time step t-1;

determining relationships between the output the flip-flops at the time step t-1 with the output of the flip-flops at a time step t-2;

determining relationships between the outputs of the flip-flops at the current time step t with the outputs of the flip-flops at the time step t-2; and

coupling flip-flops in the multi-step PRS generator in response to the relationships between the output of the flip-flops at the current time step t with the output of the flip-flops at the time step t-2.

9. A multi-step pseudo random sequence (PRS) generator, comprising:

a first flip-flop having an output $Q_{0,u}$ and a generator polynomial G_0;

a second flip-flop having an output $Q_{1,u}$ and a generator polynomial G_1;

a third flip-flop having an output $Q_{2,u}$ and a generator polynomial G_2;

a fourth flip-flop having an output $Q_{3,u}$ and a generator polynomial G_3;

an input of the first flip-flop coupled the PRS generator such that the output $Q_{0,u}$ is generated in response to $G0*[G_0*Q_{0,u-1}$ XOR $G_1*Q_{1,u-1}$ XOR $G_2*Q_{2,u-1}$ XOR $G_3*Q_{3,u-1}]$ XOR $G_1*Q_{0,u-1}$ XOR $G_2*Q_{1,u-1}$ XOR $G_3*Q_{2,u-1}$;

an input to the second flip-flop coupled to the PRS generator such that the output $Q_{1,u}$ is generated in response to $G_0*Q_{0,u-1}$ XOR $G_1*Q_{1,u-1}$ XOR $G_2*Q_{2,u-1}$ XOR $G_3*Q_{3,u-1}$; and

an input to the third flip-flop coupled to the PRS generator such that the output $Q_{2,u}$ is generated in response to $Q_{0,u-1}$.

10. The multi-step PRS generator of Claim 9, further comprising an input to the fourth flip-flop coupled to the PRS generator such that the output $Q_{3,u}$ is generated in response to $Q_{1,u-1}$.

11. The multi-step PRS generator of Claim 9, wherein the input of the first flip-flop is coupled to the PRS generator such that the output $Q_{0,u}$ is further generated in response to $G_1*[G_0*Q_{0,u-1}$ XOR $G_1*Q_{1,u-1}$ XOR $G_2*Q_{2,u-1}$ XOR $G_3*Q_{3,u-1}]$ XOR $G_2*Q_{0,u-1}$ XOR $G_3*Q_{1,u-1}$.

12. The multi-step PRS generator of Claim 9, wherein the input of the second flip-flop is coupled to the PRS generator such that the output $Q_{1,u}$ is further generated in response to $G_1*Q_{0,u-1}$ XOR $G_2*Q_{1,u-1}$ XOR $G_3*Q_{2,u-1}$.

13. The multi-step PRS generator of Claim 9, wherein the input of the third flip-flop is coupled to the PRS generator such that the output $Q_{2,u}$ is further generated in response to $G_1*Q_{1,u-1}$ XOR $G_2*Q_{2,u-1}$ XOR $G_3*Q_{3,u-1}$.

14. The multi-step PRS generator of Claim 9, further comprising an input to the fourth flip-flop coupled to the PRS generator such that the output $Q_{3,u}$ is generated in response to $Q_{0,u-1}$.

15. The multi-step PRS generator of Claim 11, wherein the input of the first flip-flop is coupled to the PRS generator such that the output $Q_{0,u}$ is further generated in response to $G_1*Q_{0,u-1}$

XOR $G_2*Q_{1,u-1}$ XOR $G_3*Q_{2,u-1}$ XOR $G_2*[G_0*Q_{0,u-1}$ XOR $G_1*Q_{1,u-1}$ XOR $G_2*Q_{2,u-1}$ XOR $G_3*Q_{3,u-1}]$ XOR $G_0*Q_{1,u-1}$.

16. The multi-step PRS generator of Claim 12, wherein the input of the second flip-flop is coupled to the PRS generator such that the output $Q_{1,u}$ is further generated in response to $G_1*[G_0*Q_{0,u-1}$ XOR $G_1*Q_{1,u-1}$ XOR $G_2*Q_{2,u-1}$ XOR $G_3*Q_{3,u-1}$] XOR $G_2*Q_{0,u-1}$ XOR $G_3*Q_{1,u-1}$.

17. The multi-step PRS generator of Claim 13, wherein the input of the third flip-flop is coupled to the PRS generator such that the output $Q_{2,u}$ is further generated in response to $G_1*Q_{0,u-1}$ XOR $G_2*Q_{1,u-1}$ XOR $G_2*Q_{3,u-1}$.

18. The multi-step PRS generator of Claim 9, further comprising an input to the fourth flip-flop coupled to the PRS generator such that the output $Q_{3,u}$ is generated in response to $G_0*Q_{0,u-1}$ XOR $G_1*Q_{1,u-1}$ XOR $G_2*Q_{2,u-1}$ XOR $G_3*Q_{3,u-1}$.

19. The multi-step PRS generator of Claim 9, further comprising a fifth flip-flop having an output $Q_{4,u}$ and a generator polynomial G_4.

20. The multi-step PRS generator of Claim 19, further comprising an input to the fifth flip-flop coupled to the PRS generator such that the output $Q_{4,u}$ is generated in response to $Q_{2,u-1}$.

21. The multi-step PRS generator of Claim 19, further comprising an input to the fifth flip-flop coupled to the PRS generator such that the output $Q_{4,u}$ is generated in response to $Q_{1,u-1}$.

22. The multi-step PRS generator of Claim 19, further comprising an input to the fifth flip-flop coupled to the PRS generator such that the output $Q_{4,u}$ is generated in response to $Q_{0,u-1}$.

23. The multi-step PRS generator of Claim 19, further comprising an input to the fifth flip-flop coupled to the PRS generator such that the output $Q_{4,u}$ is generated in response to $G_0*Q_{0,u-1}$ XOR $G_1*Q_{1,u-1}$ XOR $G_2*Q_{2,u-1}$ XOR $G_3*Q_{3,u-1}$.